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**Environmental Engineering (EE);
Green Abstraction Layer (GAL);
Power management capabilities of the future energy
telecommunication fixed network nodes;
Enhanced Interface for power management in Network
Functions Virtualisation (NFV) environments**

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Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Environmental Engineering (EE).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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Introduction

Green Abstraction Layer (GAL), specified in ETSI ES 203 237 [1], provides means of exchanging information about capabilities and parameter settings between energy-aware networking devices and their network management primitives. It allows hiding the specificities of devices and their internal operations by means of an abstract interface, through which only a description of energy-related parameters can be conveyed, read and configured.

The scenario introduced by the advent of Network Functions Virtualisation (NFV) possibly accompanied by the further increase in flexibility and programmability brought forth by Software Defined Networking, is changing the network paradigms and the associated GAL design. With NFV, network functionalities become virtualised network functions which can be automatically deployed, migrated, re-configured. The same physical machines of a provider's infrastructure may well serve the needs of different VNFs. In this NFV context, establishing a mapping between the Energy-Aware States of logical entities (e.g. virtualised network functions) and the energy consumption of the hardware hosting the virtualisation containers (e.g. virtual machines, OS containers) that execute these logical entities is a challenging task. There is therefore the need to adapt ETSI ES 203 237 [1] to the NFV environment, and to address its use in the ETSI NFV architectural framework ETSI GS NFV 006 [i.1].

The present document specifies the impact on the NFV architecture of providing virtual energy-aware states capabilities for VNFs.

The present document was developed jointly by ETSI TC EE and ITU-T Study Group 5. It is published respectively by ITU and ETSI as ETSI ES 203 682 (the present document) and Recommendation ITU-T L.1362 [i.7].

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1 Scope

The present document specifies an evolved version of the Green Abstraction Layer capable of operating within ETSI NFV environments.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] [ETSI ES 203 237](#): "Environmental Engineering (EE); Green Abstraction Layer (GAL); Power management capabilities of the future energy telecommunication fixed network nodes".
- [2] [ETSI GS NFV-IFA 011](#): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; VNF Descriptor and Packaging Specification".
- [3] [ETSI GS NFV-IFA 014](#): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Network Service Templates Specification".
- [4] [ETSI GS NFV-IFA 013](#): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Os-Ma-nfvo reference point - Interface and Information Model Specification".
- [5] [ETSI GS NFV-IFA 007](#): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification".
- [6] [ETSI GS NFV-IFA 005](#): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification".
- [7] [ETSI GS NFV-IFA 006](#): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification".
- [8] [ETSI GS NFV-IFA 008](#): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification".
- [9] [ETSI GS NFV-IFA 027](#): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Performance Measurements Specification".

2.2 Informative references

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI GS NFV 006: "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Architectural Framework Specification".
- [i.2] ETSI GS NFV-SOL 001: "Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; NFV descriptors based on TOSCA specification".
- [i.3] ETSI GR NFV-IFA 029: "Network Functions Virtualisation (NFV) Release 3; Architecture; Report on the Enhancements of the NFV architecture towards "Cloud-native" and "PaaS"".
- [i.4] [Speed Select Technology \(SST\) - Intel](#).
- [i.5] ETSI GS NFV-IFA 040: "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Requirements for service interfaces and object model for OS container management and orchestration specification".
- [i.6] ETSI GS NFV-SOL 018: "Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; Profiling specification of protocol and data model solutions for OS Container management and orchestration".
- [i.7] Recommendation ITU-T L.1362: "Power management capabilities of the future energy telecommunication fixed network nodes. Enhanced Interface for power management in Network Function Virtualization (NFV) environments".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

Container Infrastructure Service (CIS) instance: instance providing runtime execution environment for container

NOTE: In Kubernetes[®] this is a node, which consists of three components: container runtime, kubelet and kube-proxy.

Container Infrastructure Service Management (CISM): function that manages one or more Container Infrastructure Services

Energy-Aware Entity (EAE): network entity that can adapt its energy consumption such as network performance levels are satisfied

NOTE: Examples include central processing unit (CPU), virtual CPU, virtual machine, virtualised network function.

Energy-Aware State (EAS): data structure containing power, network performance, available functionalities, and responsiveness information characterizing an Energy-Aware Entity

NOTE: It can be configured by control plane processes through the Green Standard Interface.

Green Abstraction Layer (GAL): interface between data and control planes for exchanging data regarding the power of a device